

THAT WHICH IS CLAIMED IS:

1. A method for making a MOSFET comprising:
forming a trench in a semiconductor layer;
forming a gate dielectric layer lining the
trench;
5 forming a gate conducting layer in a lower
portion of the trench;
forming a dielectric layer to fill an upper
portion of the trench;
removing portions of the semiconductor layer
10 laterally adjacent the dielectric layer so that an
upper portion thereof extends outwardly from the
semiconductor layer;
forming spacers laterally adjacent the
outwardly extending upper portion of the dielectric
15 layer; and
using the spacers as a self-aligned mask for
defining source/body contact regions.

2. A method according to Claim 1, wherein
using the spacers as a self-aligned mask comprises
implanting dopants for defining the source/body contact
regions.

3. A method according to Claim 1, wherein
using the spacers as a self-aligned mask comprises
etching the semiconductor layer not covered by the
spacers.

4. A method according to Claim 3, wherein
the etching is performed to a depth equal to or less
than about 1 micron from a surface of the semiconductor
layer.

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5. A method according to Claim 1, further comprising forming source regions in the semiconductor layer adjacent the outwardly extending dielectric layer before forming the spacers.

6. A method according to Claim 5, further comprising forming a source electrode on the source regions and on the dielectric layer.

7. A method according to Claim 6, further comprising forming at least one conductive via between the source electrode and the source/body contact regions.

8. A method according to Claim 5, further comprising forming a source electrode on the source regions, on the dielectric layer and on the source/body contact regions.

9. A method according to Claim 1, further comprising removing the spacers.

10. A method according to Claim 1, wherein removing portions of the semiconductor layer is performed to a depth equal to or less than about 1 micron from a surface thereof.

11. A method according to Claim 1, wherein the gate conducting layer is recessed in the trench within a range of about 0.2 to 0.8 microns from an opening thereof.

12. A method according to Claim 1, further comprising forming a body in the semiconductor layer adjacent the trench.

13. A method for making a MOSFET comprising:
forming a trench in a semiconductor layer;
forming a gate dielectric layer lining the
trench;

5 forming a gate conducting layer in a lower
portion of the trench;

forming a dielectric layer to fill an upper
portion of the trench;

removing portions of the semiconductor layer

10 laterally adjacent the dielectric layer so that an
upper portion thereof extends outwardly from the
semiconductor layer;

forming spacers laterally adjacent the
outwardly extending upper portion of the dielectric

15 layer;

using the spacers as a self-aligned mask for
etching the semiconductor layer not covered by the
spacers; and

20 using the spacers as a self-aligned mask for
implanting dopants for defining source/body contact
regions.

14. A method according to Claim 13, wherein
the etching is performed to a depth equal to or less
than about 1 micron from a surface of the semiconductor
layer.

15. A method according to Claim 13, further
comprising forming source regions in the semiconductor
layer adjacent the outwardly extending dielectric layer
before forming the spacers.

16. A method according to Claim 15, further
comprising forming a source electrode on the source
regions and on the dielectric layer.

17. A method according to Claim 16, further comprising forming at least one conductive via between the source electrode and the source/body contact regions.

18. A method according to Claim 15, further comprising forming a source electrode on the source regions, on the dielectric layer and on the source/body contact regions.

19. A method according to Claim 13, further comprising removing the spacers.

20. A method according to Claim 13, wherein removing portions of the semiconductor layer is performed to a depth equal to or less than about 1 micron from a surface thereof.

21. A method according to Claim 13, wherein the gate conducting layer is recessed in the trench within a range of about 0.2 to 0.8 microns from an opening thereof.

22. A method according to Claim 13, further comprising forming a body region in the semiconductor layer adjacent the trench.

23. A MOSFET comprising:
a semiconductor layer having a trench
therein;
a gate dielectric layer lining the trench;
5 a gate conducting layer in a lower portion of
the trench;

a dielectric layer in an upper portion of the trench and extending outwardly from said semiconductor layer;

10 source regions adjacent the outwardly extending dielectric layer; and
source/body contact regions laterally spaced from said gate conducting layer.

24. A MOSFET according to Claim 23, further comprising a source electrode on said source regions and on said dielectric layer.

25. A MOSFET according to Claim 24, further comprising at least one conductive via between said source electrode and said source/body contact regions.

26. A MOSFET according to Claim 23, wherein a portion of said source regions include a recess over said source/body contact regions.

27. A MOSFET according to Claim 23, wherein a portion of said source regions include an opening exposing said source/body contact regions; and further comprising a source electrode on said source regions,
5 on said dielectric layer, and on said source/body contact regions.

28. A MOSFET according to Claim 23, wherein said outwardly extending dielectric layer extends from said source regions equal to or less than about 1 micron.

29. A MOSFET according to Claim 23, wherein the gate is recessed in the trench within a range of about 0.2 to 0.8 microns from an opening thereof.

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30. A MOSFET according to Claim 23, wherein said source/body contact regions are recessed within said semiconductor layer adjacent said source regions.

31. A MOSFET according to Claim 30, wherein an upper surface of the recess is equal to or less than a depth of about 1 micron from a surface of the semiconductor layer.